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Literature Analysis on the Use of Computer Based Test (CBT) in Ensuring the Quality of New Student Input in Higher Education Selection

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ABSTRACT

Digital transformation in higher education requires an evaluation system that ensures administrative efficiency as well as high accuracy in capturing the quality of student input. This study aims to synthesize the urgency of using Computer Based Test (CBT) as a high-stakes selection instrument that focuses on the efficiency, validity of the instrument, and system security. Using a qualitative-descriptive literature study method, data was analyzed from reputable scientific sources published from 2020 to 2025. The findings show that CBT significantly optimizes managerial efficiency through automated assessment and real-time data processing. In addition, the integration of Computerized Adaptive Testing (CAT) and automated question item analysis improves the validity of the content, allowing for more objective measurement of cognitive ability. However, the integrity of the selection results relies heavily on strong security protocols, such as the Safe Exam Browser (SEB), to mitigate digital fraud. In conclusion, the use of CBT is a crucial strategy to reconstruct a more intelligent, fair, and adaptive selection model. Ensuring the quality of new student input is optimally achieved if the sophistication of the software is supported by a valid question bank and a strong cybersecurity infrastructure to maintain academic credibility in the digital era.

Keywords: Computer Based Test (CBT), New Student Admission, Input Quality, High-Stakes Evaluation, Instrument Validity.

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INTRODUCTION

The level of education in Indonesia is very diverse ranging from Kindergarten, Elementary School, Junior High School, Senior High School, and College/University. After completing secondary education, individuals are faced with a strategic dichotomy, namely studying at the higher education level or making a direct transition into the job market (Dewi et al., 2024). The implementation of quality education is projected to be able to construct superior human resources (HR), especially in mastering cognitive, affective, and psychomotor aspects. This is oriented towards accelerating science and technology literacy, improving professional competence, and optimizing work productivity (Abdillah, 2024). Higher education institutions, including universities, are fundamental instruments in the process of purification and development of competitive and quality human resources (HR) (Lubalu et al., 2022). Data shows that Higher Education is the gateway for quality printers of Human Resources (HR) who have knowledge, skills, and attitudes. Thus Higher Education is the key to improving Human Resources (HR).

The development of digital technology in education has driven a significant transformation in the learning evaluation system, especially in the context of high-stakes New Student Admission (PMB) selection. New Student Admissions (PMB) is a strategic mechanism implemented by higher education institutions to recruit and select prospective students who meet

the qualification standards and determinant criteria that have been set (Nurjanah, 2026). Higher education institutions are required to adopt proactive steps through the formulation of adaptive policies and strategies to maintain their functional existence. This is triggered by accelerating global dynamics, both in the dimension of technological innovation (including products, services, and processes) and in shifting socio-economic structures of society (Hikmawati et al., 2023). There is one crucial determinant that is universal across disciplines and significantly affects the effectiveness of achieving the output target of competent graduates. This factor refers to the quality of input, namely the characteristics and academic qualifications of new students (Annizar & Arifin, 2021). These findings indicate that the development of digital technology is developing rapidly, universities are required to have proactive steps through policies and strategies in the use of technology. Thus, the use of digital technology in the learning evaluation system, especially the selection of New Student Admissions (PMB) is needed because it is high-stakes.

The learning evaluation at PMB functions as an academic selection tool to assess the readiness and ability of prospective students to be in accordance with the chosen study program. Evaluation instruments implemented to measure the effectiveness of the process and learning outcomes of students dichotomously can be classified into two main categories, namely test and non-test instruments (Iskandar et al., 2024). One of the dominant instruments used is Computer Assisted Test (CAT) or Computer Based Test (CBT). CBT represents a computational-based evaluation method that is oriented to objectively measure the achievement of the minimum standard of basic competencies (Natadisastro & Harahap, 2026). The fundamental differentiation between Computer Based Test (CBT) and conventional paper-based exams is manifested in procedural efficiency, acceleration of processing of assessment results, and the implementation of paperless concepts that contribute significantly to resource optimization (Ibrahim et al., 2026). The implementation of Computer Based Test (CBT) offers operational efficiency in the administration of exams, the ability to integrate various multimedia formats, and accuracy and acceleration in the process of evaluating learning outcomes (Nurwahyudi & Kurniawan, 2025). These findings show that the learning evaluation system is divided into two, namely tests and non-tests, one of the learning evaluation media is CBT which integrates exams using computers as an exam component. Thus, the use of CBT in the PMB selection is very important in relation to the need for high efficiency and accuracy in the entrance exam examination.

Although the current literature has extensively documented the administrative advantages and efficiency of CBT technology in speeding up the assessment process (Ibrahim et al., 2026; Nurwahyudi & Kurniawan, 2025), there is still a critical gap in its application as a high-stakes selection instrument. The majority of previous studies have focused more on the technical aspects of software and resource savings, but there is still very little literature that critically reviews how CBT systems ensure content validity and outcome integrity amid digital security challenges. There is a gap in the review regarding the extent to which the efficiency of this technology is directly proportional to the quality of the standardized questions produced. Therefore, this literature study aims to synthesize the urgency of developing an entrance selection system that is not only fast in process, but also has high accuracy in capturing the quality of new student input.

METHOD

This study uses a qualitative-descriptive literature study method. The method is carried out by searching, reviewing, and analyzing various literature sources relevant to the research topic (Awwalin & Syaipudin, 2025). The data in this study is sourced from various scientific references such as national journals, textbooks, and relevant research reports (Adibah, 2025). Data collection is carried out by browsing and accessing scientific articles through various trusted database platforms, such as Google Scholar, SINTA, DOAJ, ResearchGate, and several university digital libraries (Adibah, 2025). Keywords used in literature searches included: "Computer Based Test (CBT)", "New Student Admissions (PMB)", "High-Stakes Evaluation System", and "Quality of Student Input".

Data sources include articles from reputable national and international journals published in a maximum period of five years (2020-2025), as well as academic textbooks published in the last ten years that discuss learning motivation theory and motivation-based learning design (Aisyah, 2025). The data that has been collected is analyzed using content analysis techniques and narrative synthesis. The Content Analysis that the researcher uses in this study is Descriptive Content Analysis to describe or describe in detail a message (Rahmatullah, 2025). The researcher reduced the data by grouping the literature into several central themes, namely (1) Technical and administrative efficiency of CBT, (2) Validity of digital evaluation instruments, (3) Security and integrity challenges in high-stakes selection. All data is then synthesized to build a new conceptual framework regarding the quality assurance of new student input through strengthening the digital selection system.

FINDINGS AND DISCUSSION

Technical and Administrative Efficiency of CBT in PMB Selection

Computer-Based Exams are a form of evaluation that uses a computer device or internet network to access exam questions, most of which are presented in the form of multiple choice (Pratama, 2024). One of the evaluation methodologies that is now beginning to be implemented extensively and gradually adopted in the education system in Indonesia is the Computer Based Test (CBT) (Maulana & Nurmalasari, 2025). Based on the results of the analysis of the literature, the efficiency in the use of CBT in the selection of new students is not only seen from the Paperless aspect, but also from the optimization of data management (Ibrahim et al., 2026; Nurwahyudi & Kurniawan, 2025; Prabowo & Tyas, 2022).

Descriptive analysis showed that CBT cut processing time compared to manual methods. In line with this, the literature shows that regarding increasing the effectiveness of assessment in the selection of New Student Admissions (PMB), the transition to a Computer Based Test (CBT) system significantly reduces the burden of administrative time through automatic assessment functionality and the integration of systemic data collection (Matondang et al., 2024). Computer Based Test (CBT) is able to improve temporal efficiency and resource optimization through the digitization of evaluation instruments. This transformation eliminates dependence on physical stationery and accelerates the entire participant data processing cycle in an integrated manner (Riza et al., 2025). The implementation of the Profile Matching algorithm in the Computer Based Test (CBT) application is able to accelerate the selection process for new students while optimizing the accuracy of the computation of exam results (Fadilah & Shofa, 2021). In this context, it can be understood that the use of the CBT system has advantages over conventional systems. Thus, it can be concluded from various literature that the use of the CBT system in PMB selection has a high level of effectiveness, especially in assessment and data management.

Literature findings indicate that the implementation of Computer Based Test (CBT) allows the use of more varied stimulus instruments, which facilitates a more precise assessment of prospective students' cognitive abilities. In line with this, previous studies have shown that CBT has the ability to present flexible question items, including the integration of multimedia elements such as visual imagery, audio, and more coherent stimulus structures (Murniati, 2017, as quoted in Nasir et al., 2023). An analysis of this literature confirms that the integration of multimedia elements is not just a complementary feature, but a crucial instrument to reduce the ambiguity of the question item. Furthermore, the Computer Based Test (CBT) system provides autonomy for institutions to configure assessment weights and modify content independently, in line with the parameters of competency standards that have been set (Aminudin & Susilo, 2021). This proves that CBT has adaptive advantages in capturing the quality of student input through more representative evaluations.

The most striking result of the use of the CBT system is the reduction of human involvement in the scoring process which increases the transparency of the high-stakes selection results. In line with this, the literature shows that a computer-based exam system facilitates prospective students in completing evaluation instruments through digital devices that are integrated with automatic correction features. This mechanism ensures the availability of exam

results in an accelerated and precise manner, which simultaneously reduces the administrative burden, time allocation, and operational costs of the selection committee (Riza et al., 2025). Through this system, respondents complete the evaluation instrument directly on a computer device and obtain scores in real-time. The implication is that the probability of academic malpractice or cheating can be significantly minimized (Sabarwati et al., 2025). The parameters of the effectiveness of an evaluation instrument are determined by its ability to identify discrepancies or errors in an accelerated manner, thus facilitating timely problem resolution (Waluyo & Andrianto, 2021). This assessment automation serves to guarantee that the scores obtained by students are truly pure as a result of their work without the intervention of other parties. Overall, the implementation of the CBT system has proven to be an effective option to create a transparent and efficient selection process.

The Validity of Digital Evaluation Instruments in Ensuring Input Quality

The CBT system is a key instrument to obtain a minimum standard of competence. However, the validity of this instrument is highly dependent on the quality of the question bank (Annizar & Arifin, 2021; Natadisastro & Harahap, 2026). In the implementation of Computer Based Test (CBT), there are several crucial determinants that require special attention, including aspects of participant identity authentication, the quality and security of the question bank (bank items), and the stability of the CBT system infrastructure itself (Najib & Masnawati, 2025). The existence of an item bank not only functions as an instrument that facilitates the administration of questions, but also allows managers to conduct a comprehensive analysis of question items (item analysis). This plays a crucial role in efforts to improve the quality of evaluation instruments in a sustainable manner through material improvement based on empirical parameters (Najib & Masnawati, 2025). By conducting regular analysis of question items, institutions can ensure that the difficulty level of the question is always maintained and relevant to the competencies to be measured. Therefore, the success of CBT-based exams is not only determined by the sophistication of technology, but also by the commitment to maintain and update the quality of the question bank on an ongoing basis.

To ensure the quality of student input, the CBT instrument must go through strict validity and reliability tests so that the questions presented really capture the academic readiness of prospective students. In line with this, the literature shows that the determination of the quality of an evaluation instrument is fundamentally measured based on reliability and validity parameters (Nurwahyudi & Kurniawan, 2025). The purpose of this stage is to minimize and eliminate potential for discrepancy, system defects (bugs), and functional failures (errors) in the developed application, in order to ensure the reliability of system performance when implemented (Najib & Masnawati, 2025). The validity test was implemented to measure the extent to which the research instrument was able to accurately represent the variables being studied. Meanwhile, reliability testing is carried out to evaluate the level of consistency and stability of the instrument, to ensure that the measuring instrument provides consistent results when used in repeated observation (Prawira, 2026). This testing step ensures that each question item not only functions technically in the system, but is also able to provide consistent and reliable assessment results for the decision-making team. Therefore, a mature validation and reliability process is an absolute requirement for CBT to function as a fair and objective selection instrument for all prospective students.

The use of digital technology allows PMB selection organizers to automatically analyze question items to identify the level of difficulty and differentiating power of the questions, so that the selection only passes the input that is truly competent. In line with this, the literature shows that digital constructivism expands this paradigm by integrating technology as a comprehensive medium of interaction. This approach allows for the implementation of interactive, adaptive, and multimedia-based assessments to facilitate the dynamic knowledge construction process (Adhim et al., 2025). Innovations in the development of evaluation instruments include the integration of multimedia elements to increase the authenticity of assessments, the implementation of adaptive questioning schemes that adjust to the level of competency of participants, and an immediate feedback system that is able to provide instant learning opportunities for students (Syahputra et al., 2025). Computerized Adaptive Testing (CAT) optimizes the estimation of participants' abilities through the presentation of question items dynamically, where the difficulty level of each

instrument is automatically adjusted based on the accuracy of the response to the previous question item (Tang et al., 2026). The application of this adaptive and interactive system ensures that each participant gets an exam experience that is appropriate to his or her ability level, so that the results obtained become more accurate and objective. Overall, the integration of digital technology in evaluations not only simplifies administration, but also improves the quality of selection through a smarter and more in-depth assessment approach.

Security and Integrity Challenges in High-Stakes Selection

As a system that determines the future of prospective students, the integrity of exam results is the biggest challenge. This phenomenon indicates that the implementation of technology in the selection system must be integrated with comprehensive supervision mechanisms, strengthening cybersecurity infrastructure, and rigid integrity of organizers. This is crucial to ensure that the merit system principle can be consistently actualized in the recruitment process (Tang et al., 2026). The security aspect is a top priority in the implementation of an online-based exam system (Nurcholiq & Ayudewi, 2026). In addition to managerial efficiency, the implementation of computer-based exam systems substantially strengthens the integrity of evaluation implementation through the escalation of technology security standards (Riza et al., 2025). Therefore, strengthening technological security is an important investment to maintain justice for all prospective students and ensure the credibility of the institution organizing the selection.

Although administratively efficient, digital systems have the risk of cyberattacks or bank leaks if they are not supported by adequate IT infrastructure. In line with this, the literature shows that the integration of Node.js technology and Safe Exam Browser (SEB) in the CBT system strengthens the security of questions and limits access to external information, in order to ensure the integrity of the implementation and validity of the exam results (Farida et al., n.d.). Platforms such as ProctorU or Safe Exam Browser support summative assessments with security features that ensure academic integrity (Cuhanazriansyah et al., 2025). This application was first developed when the computer-based National Exam (CBT) began to be implemented, where the Safe Exam Browser (SEB) became one of the mandatory software on computers (Juanda, 2025). The implementation of this controlling software serves as a standard protocol to prevent participants from committing digital cheating, such as accessing search engines or communicating with outside parties during the exam. Thus, the use of security technologies such as Safe Exam Browser is a crucial need in the CBT ecosystem to mitigate cyber threats and maintain the confidentiality of evaluation data on an ongoing basis.

CONCLUSION

Based on the results of the literature analysis and the discussion that has been presented, it can be concluded that the use of Computer Based Test (CBT) in the selection of New Student Admissions (PMB) is a crucial strategy to ensure the quality of student input in the digital era. The main conclusions of this study are:

1. Managerial Efficiency and Accuracy: CBT significantly transforms the administration of selection through the automation of assessment and optimization of data management. This cuts down on processing time to deliver results in real-time, which in turn increases transparency in high-stakes selection.
2. Quality Assurance through Validity: The quality of student input is not only determined by the sophistication of the software, but by the validity and reliability of the question bank. The use of technology such as Computerized Adaptive Testing (CAT) and automatic question item analysis ensures that the evaluation instrument is able to photograph the cognitive abilities of prospective students more accurately and objectively.
3. Integrity as a Key Pillar: The efficiency and validity of the instrument will only be meaningful if it is supported by a robust security system. The implementation of protocols such as Safe Exam Browser (SEB) and digital proctoring technology is an absolute

necessity to mitigate the risk of cheating and maintain the academic integrity of the institution.

Overall, the integration of digital technology in the evaluation system is not just a media transition from paper to computer, but an effort to reconstruct a selection model that is smarter, fairer, and adaptive to the needs of higher education quality standards.

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